

Claims

7. 1. A process for the conversion of one or more  
unsaturated hydrocarbons to one or more epoxides  
5 which process comprises reacting one or more  
unsaturated hydrocarbons in a reaction mixture under  
oxidation conditions in the presence of an oxidant,  
a heterogeneous catalyst and a solvent characterised  
in that the catalyst comprises a Group IVB, VB or  
10 VIB metal and that carbon dioxide is present in the  
reaction mixture under supercritical conditions.
2. A process as claimed in claim 1 wherein the catalyst  
is a metal molecular sieve.
- 15 3. A process as claimed in claim 1 or claim 2 wherein  
the metal is a Group IVB metal.
4. A process as claimed in claim 3 wherein the metal is  
20 titanium.
- 5 A process as claimed in any one of claims 1 to 4  
wherein the solvent is methanol.
- 25 6. A process as claimed in any of the preceding claims  
wherein the oxidant is hydrogen peroxide.
7. A process as claimed in any one of the preceding  
claims wherein the unsaturated hydrocarbon is an  
30 olefin.
8. A process as claimed in any one of claims 1 to 7  
comprising an additional step wherein the epoxide is  
converted to one or more acids or alcohols.
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9. A process as claimed in claim 8 wherein the one or more acids or alcohols are linear acids and linear alcohols.
- 5 10. A process as claimed in any of the preceding claims wherein the ratio of solvent to unsaturated hydrocarbon is less than 8:1.
- 10 11. A process as claimed in any of the preceding claims wherein the reaction mixture comprises at least 1% by weight of carbon dioxide.
- 15 12. A process as claimed in claim 11 wherein the reaction mixture comprises at least 25% by weight of carbon dioxide.
- 20 13. A process as claimed in any of the preceding claims wherein the carbon dioxide constitutes more than 50% by weight of the solvent used in the reaction mixture.
- 25 14. A process according to any one of claims 4 to 13 wherein the catalyst is selected from one of the following: TS-1, TS-2, TS-3, titanium zeolite beta, TS-48, titanium mordenite and titanium silicalite.
- 30 15. A process according to any of claims 1 to 14 wherein the reaction residence time is at least 20% less than that required to achieve 50% conversion without the presence of carbon dioxide.
16. A process according to claim 15 wherein the reaction residence time is at least 50% less.
- 35 17. A process according to either claim 15 or claim 16 wherein the conversion is 90%.

18. A process as claimed in any of the preceding claims wherein the reaction pressure is between 1 and 700 atmospheres.
- 5 19. A process as claimed in any of the preceding claims wherein the epoxidation reaction temperature is from 0°C to 100°C.
- 10 20. A process as claimed in claim 19 wherein the reaction temperature is within the range 40°C to 80°C.
- 15 21. A process as claimed in any of the preceding claims wherein the reaction residence time is within the range 10 minutes to 48 hours.